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ABSTRACT

This study examines the effects of different kinds of verbal instructions given by teachers on the perfcrmance of young children, investigating whether task performance is significantly affected by small changes in verbal content or in the sequence of components of an instruction. Kindergarten children (48 boys and 52 girls) were randomly assigned to four groups and required to complete ten tasks involving selected tracing of geometric shapes. Each group received one of four kinds of instruction: (1) simple core instruction, a positive statement of the task to be completed; (2) simple core instruction with the implicit negative "just" included; (3) simple core instruction followed by an explicitly negative statement; and (4) simple core instruction preceded by the explicit negative. Subsequently, the Development Test of Visual-Motor Integration was administered. Results indicated that instruction types 1 and 4 produced superior performance relative to instruction type 3. No other contrasts were significant. Results suggest that teachers should be aware of the effects of small differences in messages on the performance of young children. (CM)

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THE EFFECT OF MESSAGE STRUCTURE IN VERBAL INSTRUCTIONS TO KINDERGARTEN CHILDREN

by

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Introduction

Teachers spend a great deal of time talking to children. The ultimate goal, of course, is that the teachers' verbal behavior, in conjunction with non-verbal experiences, will lead to the children's achievement of the goals of schooling more expeditiously than if these behaviors were omitted. Verbal communication can be successful only to the extent that there is congruence between the intent of the speaker (encoder) and the perception of comprehension of that intent on the part of the listener (decoder).

In the case of communication between teachers and young children, the teacher's responsibility for accurate communication is particularly acute. A message which is totally comprehensible to an adult and promotes accurate performance of a task may be confusing to the young child whose language fluency is not yet fully developed (Chomsky, 1969). Although many studies have examined this problem from the perspective of children's language development, few have devoted attention to the teacher as an encoder.

This study is concerned with variables which might influence the effectiveness of teachers' verbal instructions to young children. Specifically, it tested whether the young child's execution of specified tasks was significantly affected by small changes in verbal content (e.g., addition of a cautionary word such as "just" or "only") or in the sequence of components of an instruction.

An adaptation of Shannon and Weaver's (1949) model for communication (cited in Andersch, 1969) shown in Figure 1, represents the essential features of these processes.

Insert Figure 1 about here

In Figure 1, the dotted triangle indicating the encoder's cognitive representation of an instruction includes both the representation of an object, or symbol, and the representation of the action to be taken in regard to the object or symbol (i.e., the communicative intent). The decoder's cognitive representation in the model likewise includes both object and action.

The communication process, as represented in Figure 1, is sequential over time. The decoder's performance is a function of all prior processes. Success dependencies operate in the reverse of the process itself. That is, the performance of the decoder is a direct function of his own cognitive response to the act, which in turn is a function of the accuracy of the decoding process, which is itself dependent upon the adequacy of the verbal representation, and so on. In order to be effective, the encoded message must be clearly organized and the content must be appropriate to prior learning or skills of the decoder. Two questions arise: 1) "Which differences between young children and adults would account for a difference in decoding behavior?" and 2) "What specific verbal components should teachers attend to in encoding messages to young children for maximum decoding success?"

Cautionary words such as "just" and "only" are commonly found as verbal markers in teachers' explanations and mandates to young children (Gehlbach, 1975). A cautionary word is especially interesting, in that it is a marker which implies a negative instruction, i.e., what not to do. For example, "trace just the part of the circle which ..." implies that the listener should not trace all of the circle.

Clark (1974) compared latencies for verifying an affirmative sentence with those for verifying negative ones. He concluded that the negative is more difficult to process, reasoning that a negative instruction leaves open more alternatives. When one is told what not to do, there are still many choices left for what one should do. Thus, the message "do not trace all of the circle" may, by virtue of imprecise specification, confuse a young child. On the other hand, if used in conjunction with a positive instruction, the negative might serve as a verbal marker, or warning, thus limiting an over-generalized response to a specific instruction.

These tasks are common in the curriculum of most kindergartens. Therefore, special consideration is needed to determine the effects of such variables as cautionary words, or explicit negatives on instructions which have specific limitations.

The Young Child as a Special Case

Language development. Studies of language development in the last three decades have investigated the nature of the code, the development process, and the effects of socio-economic and cultural variables on this development. Observations of size of vocabulary, length of sentences, and frequency of word usage have led to the development of a number of

theories. In most of these studies, the emphasis has been on the production of language, or encoding skills of the young child, rather than on the decoding skills (Braine, 1971; Bloom, 1970; Gluckburg, Krauss and Higgens, 1975). One notable exception is Chomsky's (1969) work on the child's command of syntactic structures.

Whether we consider size of vocabulary, acquisition of the negative, or development of a knowledge of syntax, there is evidence of a disparity between the language fluency of the young child and the adult. Because of this disparity, instructions which might be quite adequate for an adult or older child may be inappropriate for a child of kindergarten age.

In order to adapt instructions so that they will be appropriate, and accurately comprehended, the teacher needs more information than is presently available regarding the effects of specific lexical and syntactical changes in verbal instruction to young children.

Cognitive Development. There appears to be a consensus in the literature that there is a difference between the cognitive structures of the child and those of the adult. However, no such consensus exists in the explanations for, or even the descriptions of, this difference.

While researchers may differ in their approaches to the problem, in their theories as to cause, and even in their definitions of the referrent words (e.g., perception, comprehension, or cognition) there appears to be agreement that the cognitive development of a young child is not the same as that of an adult (Gibson, 1962; Olson, 1970; Piaget, 1970). The young child perceives and makes sense of his world in quite a different way. The questions which still need to be answered are: 1) "What information

does the young child need?" and 2) "What kind of organization of the information is necessary for the child to understand the learning task?" More specifically, in the case of verbal instructions, we must ask, "What information must the message contain that is different from the information needed by an adult?"

Personality traits. A third dimension which should be considered in the development of the young child is that of personality. Kagan (1965) categorized children as impulsive or reflective by examining error scores and latency scores on his Matching Familiar Figure Test.

Whether a change in a child's personality occurs by gradual development or by means of specific training (e.g., training towards reflectivity as proposed by Zelniker et al, 1972), it will be a long-term process. To improve communication and decoder success on a short term basis may require modification of the teacher-encoder's instructional speech. If a young child is less reflective than an older child or adult, as appears to be the case (Katz, 1971), a related question with respect to impulsivity and reflectivity is whether the structure of a verbal instruction (i.e., as opposed to additional instruction such as waiting for a start signal) influences the latency/accuracy of children's responses. The effectiveness of a verbal instruction to a child might be increased by verbal cues which call attention to features not normally attended to, thus leading the child toward more reflection on, or consideration of, alternative behaviors.

Teacher-effectiveness Research

An important decision which has to be determined in any research is which variables are to be examined. Dunkin and Biddle (1974) have proposed

a model for the study of teaching effectiveness which delineates four major types of variables in the teaching-learning process: 1) presage variables (the teachers' formative experiences, training, and characteristics); 2) context variables (pupil characteristics and environmental variables); 3) process variables (classroom behavior for both teachers and pupils); and 4) product variables (immediate pupil growth and long-term pupil effects).

Presage variables and context variables. Dunkin and Biddle (1974) classify decoder characteristics as context variables. This classification reflects their concern with teacher behavior as a result of teacher-pupil interaction, and it does not lend itself to detailed analysis of the effectiveness of verbal instruction. In order to analyze the communication process as distinct from general classroom behavior, it is necessary to separate encoding from decoding. Figure 2 indicates this separation in a model which adds the Dunkin and Biddle classification to the communication model illustrated earlier in Figure 1.

Insert Figure 2 about here

The model in Figure 2 also distinguishes between the inevitable impact of decoder characteristics on the decoder's cognitive representation and decoder performance, and the possible but not inevitable impact of decoder characteristics upon encoding technique. The impact on the decoder's cognitive representations functions as a presage variable; the possible impact on encoding functions as a context variable. Whether the context variable affects encoding depends upon the encoder's degree of awareness of the decoder's presage variables. A dotted line is used

in the model to indicate that the degree of encoder awareness determines the extent to which pupil presage variables become a factor in the encoding process.

Process variables and product variables. The empirical linking of teacher behaviour (process variables) and pupil outcomes (product variables) were noted earlier as the distinguishing feature of research on teaching effectiveness. Teacher behaviour is roughly divided into methods or strategies, and skills or techniques.

Effectiveness depends on the techniques and skills employed within the method, and on their appropriateness for the group of pupils.

Functionally, the lecture bears some relationship to teachers' verbal instructions to young children. In both situations the teacher, as an encoder, delivers a message, or series of messages, to the pupil. The pupil, in turn decodes the message to the extent that he is able to process the information.

In a review and discussion of the research on the lecture method, McLeish (1976) cites a number of studies which categorize and tabulate the various aspects of this method.

Studies differ in their conclusions regarding comparison of the traditional lecture method with other methods such as programmed instruction (Pikas, 1969; Himmel, 1972), and McLeish makes no definitive statement regarding the conclusions. Research on the lecture has also dealt with the relating of information in fairly long sequences of teacher discourse. In these respects, it has little bearing on teachers' instructions to young children. However, an examination of some of

the techniques, or variables within the lecture method, might provide valuable insight.

Unfortunately, even within the lecture method, or any other method such as discussion, tutoring, or programmed instruction, most of the variables examined in research on teaching effectiveness deal with broad or general concepts -- with micro-variables such as undifferentiated, or only generalized, categories of "teacher talk."

In the investigations of micro-variables within the lecture, subjects have been from upper-elementary to university levels, with verbal fluencies approaching or equal to those of an adult.

Using the same video tapes and transcripts, and the same original sample as Rosenshine (1968), Hiller (1969) found a significant negative correlation between vagueness in a lecture, and retention of material. In Gehlbach's (1975) study, with 120 kindergarten children, this correlation was not borne out ($r = -.05$). This is not to say that vagueness is not a significant variable. It simply suggests that a measurement of vagueness may not be appropriate if there is a mismatch in levels of fluency between the encoder and decoder. Examining the effectiveness of instructions to young children in terms of variables, such as organization or vagueness, is comparable to examining these same variables as criteria of effectiveness in a lecture delivered in French to an English-speaking audience, where decoding problems control the variance in decoder performance, to such an extent that variance attributable to encoding is obscured.

The use of advance organizers is another strategy which could possibly have importance in a study of instructional effectiveness (Ausubel, 1960); Barnes and Clawson, 1975). While the idea of advance organizers has credibility, the research does not directly provide information which is relevant to verbal instructions to young children. Large units of analysis in which a multiplicity of smaller variables (micro-variables) could be functioning to cloud results, and a written presentation to a child who has not yet mastered reading, are inappropriate.

An orienting statement, while not identical to an advance organizer as described by Ausubel (1960), has some similarities which might bear investigation. The idea of providing advance orienting information for the listener makes common instructional sense, and the use of orienting statements is a common practice for teachers of young children (Gehlbach, 1975).

Gibson (1969) might predict that an orienting statment would call the decoder's attention to distinctive features of the information following (e.g., "Trace the part of the circle which ..."). The addition of an explicit negative, rather than simply being a verbal marker of importance (Pinney, 1969, cited in Gage and Berliner, 1975), may serve as an orienting statement (e.g., "Do not trace all of the circle. Trace the part of the circle that ..."). For this reason, the explicit negative warrants further investigation in a study of verbal instructions to young children.

To date, much of the research on teaching effectiveness has been correlational, producing results which, even when highly significant in

statistical terms, form a questionable base for instructional design. However, significant correlations may be a starting point for experimental manipulation of variables which could produce information which could have a direct bearing on the effectiveness of teachers' instructions to young children.

Gage (1963) proposed a study of micro-variables as a route of investigation for selection for specific, measurable criteria for teacher effectiveness. In response to Gage's proposal, Gehlbach (1975) investigated verbal correlates of instructional effectiveness with kindergarten children.

In Gehlbach's study, sixty teachers were asked to generate taped messages to verbally direct 120 kindergarten children in the completion of eight visual-motor tasks. The messages were examined for micro-features (e.g., individual words and sentence structure) which were likely to affect the selectivity of children's decoding of the instruction and response to the task, and whose frequencies would correlate with decoder success. A common error made by the children in decoding the teachers' instructions was to make an indiscriminate, or generalized response when a selective or limited response was indicated in the instruction. For example, children would trace <u>all</u> rather than a specified portion of a geometric figure. In a post hoc analysis of the data, "the principal difference between successful and unsuccessful teacher-encoders seemed to reside in their relative abilities to communicate to the decoder, with adequate instructional power, the points at which the generalizable response was to be started and stopped, or at least applied with caution" (Gehlbach,

1975, p. 27). Two important variables which emerged were cautionary words (e.g., "only" and "just") and explicit negatives (e.g., "Do not trace all ..."). In two of the tasks, correlations of the occurrence of cautionary words in an instruction with the decoder's performance success were 0.33 and 0.35 (N = 60). Likewise, correlations for use of an explicit negative and decoder success were 0.26 and 0.36 (N = 60).

Gehlbach's (1975) study represents the first two stages of Rosenshine and Furst's (1973) three-stage paradigm for research on teaching effectiveness. Rosenshine and Furst propose that research on teaching effectiveness should begin with direct observation of what actually occurs in the classroom, in terms of teacher behaviour as described by strategies and techniques. Following this, correlational studies should investigate possible relationships between these occurrences and pupil outcomes. Since correlation does not imply a casual relationship, correlations which suggest a strong relationship should be subjected to experimental designs in which the pupil outcome is a dependent variable, and the strategy or technique is manipulated as the independent variable. Given the appropriateness of the Gehlbach (1975) study, the present research is built directly upon it, and moves from the correlational to the experimental phase.

This study, like the Gehlbach study, differs from the balance of the existing research in several ways: 1) it attends specifically to concerns that are unique with young children whose language development is not complete -- to features of verbal instructions which would not produce demonstrably different performance in the average adult (e.g.,

use of a cautionary word such as "just" or "only"); 2) it deals with mandates for use of skills already learned (e.g., tracing a circle); 3) it utilizes taped messages of verbal instruction, insuring exact duplication of content, vocabulary, sentence structure, and prosodic variables such as pitch or speed. It also searches for micro-variables in verbal instruction which result in effective decoding that is not highly variable across children.

A concern in the design of the present study which was not attended to in the Gehlbach study is the possibility of aptitude-treatment interactions. Pupil characteristics such as visual-motor integration and impulsivity may influence or obscure experimental results on tracing or drawing tasks. An examination of the literature on impulsivity and reflection sheds little light on problems of designing the most efficient instructional messages for pre-school children (Kagan, 1968; Katz, 1971, etc.). This is partly due to the lack of impulsivity-reflectivity research with children in this age group, and also due to the fact that impulsivity and reflectivity are, by definition, characteristics of only about two-thirds of the population (Kagan, 1965). If characteristics such as impulsivity or reflectivity do produce differences in performance, a measure of latency (time elapsed between end of instruction and beginning of performance of task) would provide additional information regarding the relative merits of different types of messages across children. Likewise, in the performance of tasks such as the tracing of geometric figures, visual-motor integration could affect the performance of individuals

(Beery, 1967). Therefore, measures of this variable might also clarify the relative merits of messages which differ in content or sequence of elements.

Based on Gehlbach's correlational study, this experiment tested the use of cautionary words and explicit negatives in oral instructions (mandates) to kindergarten children. Latency of response and visual-motor integration were measured to generate possible covariates. The negative effect of vagueness, as discussed earlier, was not supported by Gehlbach (1975). Therefore, it has not been included as a variable in this study. The following hypotheses were tested: 1) based on Gehlbach's findings, a message containing some form of cautionary instruction (e.g., an implicit negative such as "just") would be decoded more successfully than a message containing only a positive statement of the discrimination needed to successfully complete a task; 2) according to Gibson's (1969) theory of perception and Pinney's (1969) study of verbal markers, a message containing an explicit negative would be decoded more successfully than either one containing only a positive statement of the discrimination, or the positive statement plus a cautionary word. To test for possible effects of sequence, the explicit negative was presented either before, or after, the positive statement; and 3) visual-motor integration would correlate significantly with success as measured by task scores (Beery and Buktenika, 1967). However, when VMI was employed as a covariate, the hypothesized differences in messages would remain significant, considering the general similarity for language development and cognitive development.

Method

Subjects

Forty-eight boys and fifty-two girls from twelve kindergarten classes participated in the study. Their ages ranged from 65 to 76 months, and all children were from English-speaking homes in Burnaby, British Columbia, Canada.

Materials

Instructional tasks. To measure the dependent variable of decoder success, ten tasks involving the tracing of selected parts of overlapping or adjacent geometric figures were developed with corresponding audio-taped messages. For example, on a paper showing an overlapping circle and square, one task was to trace the part of the circle which covered the square, as shown in Figure 3. The geometric shapes used were the circle, the square, the rectangle and the triangle. These shapes are recognized by virtually all children by the end of the kindergarten year, although the triangle and the rectangle are sometimes confused at this age. Both the general recognition and the occasional confusion were demonstrated in the warm-up tasks, as noted in Procedures in the following section. Tasks were designed so that those which contained both the triangle and the rectangle required the child to trace the one segment common to both shapes, thus eliminating errors due only to a reversal in recognition. Sample tasks are reproduced in Figures 3 and 4.

Insert Figures 3 and 4 about here

Messages for the ten tasks were recorded in each of four conditions:

Condition A. Simple core instruction. A positive statement of the task to be completed. (Example: "Trace the part of the circle that covers the square.")

Condition B. The core instruction (A) with the implicit negative "just" included. (Example: "Trace just the part of the circle that covers the square.")

Condition C. The core instruction (A) followed by an explicitly negative statement. (Example: "Trace the part of the circle that covers the square. Do not trace all of the circle.")

Condition D. The reverse of Condition C, with the explicit negative preceding the core. (Example: "Do not trace all of the circle. Trace the part of the circle that covers the square.")

Test of Visual-motor Integration. Beery and Buktenika's (1967) Development Test of Visual-Motor Integration (VMI) was administered to measure the visual-motor integration level for each child and to generate a covariate for an analysis of variance.

Procedure

Each child was tested individually, in a separate room near or adjacent to the classroom, and was introduced to the experimental setting by means of informal conversation. The Development Test of Visual-Motor Integration was administered according to the instruction manual, and age and sex were recorded. A set of simple warm-up tasks familiarized the child with the taperecorded instructions and verified his knowledge of shapes involved in the experimental tasks.

Children were randomly assigned to one of the four instructional conditions. The ten tasks were presented in randomized orders for condition A, and these orders were replicated in each of the other conditions. Instructions for each task, in each condition, were recorded on separate cassettes, which facilitated presentation in the specified order. Cassettes were numbered by task and color-coded by condition. The subject's identity number was recorded on the back of each task sheet.

All tests were administered by the experimenter. Task sheets were presented one at a time, and preliminary instructions were the same for each subject. No indication was given as to the correctness of a response.

Scoring

Latency, recorded to the nearest tenth of a second, was measured from the end of a recorded message until the child began to trace.

VMI tests were scored according to the test manual, and raw scores were used for analysis. Performance on the tracing tasks was scored blindly. Criteria were established for each task to yield a possible accuracy score of 0 (no attention to required discrimination), 1 (partial success) or 2 (perfect task completion). Total scores were also computed for each subject.

Results

With the ten tasks treated as items from a single test, the alpha coefficient of internal consistency was .81 for the pooled sample. Correlations of individual test items with the total test ranged from .58 to .73, with the exception of task 8, for which the correlation with the total test was only .12. It seemed apparent that task 8 was either ambiguous, or measuring something considerably different from the other

tasks. When task 8 was removed from the scale, the coefficient alpha for the remaining nine tasks treated as a single scale was .85. In all subsequent analyses, task 8 was excluded in forming the total scale score for tracing tasks.

An accuracy score was computed for all subjects as the total of all nine individual task scores. The latency scores were computed similarly as the total over all nine tasks. The VMI score was the total number of drawings correct on the Age Two to Eight section of the Beery and Buktenika test. Means and standard deviations for accuracy scores, latency scores, visual-motor integration scores and age are shown in Table I for each of the four conditions: 1) Core; 2) Core + Caution; 3) Core + Negative (Core+Neg); and 4) Negative + Core (Neg+Core). The distribution of boys and girls was 12 and 13 respectively, in all four conditions.

Insert Table I about here

Correlations between total task accuracy scores and the variables of age, sex and latency were generally low. There was a significant correlation of .46 ($p = .01$) between accuracy and VMI in the total sample. When the four conditions were examined separately, significant correlations for task scores and VMI ranged from .40 ($p = .02$) to .57 ($p = .002$). The only other significant correlations were between VMI and sex, in the Core condition (.41, $p = .02$), and between VMI and latency in the Core + Neg condition (-.42, $p = .01$).

As a result of the significant correlations of VMI with accuracy in all conditions, and with latency and sex in some conditions, these variables

were examined further. Two-way analyses of covariance (sex x condition were conducted on both the latency and accuracy scores, with age and VMI as covariates. Age emerged as a non-significant covariate ($p = 0.999$), and was not considered further. VMI emerged as a significant covariate only in the analysis of accuracy scores ($r = 0.46$, $p = 0.001$).

Group means for accuracy scores were adjusted for differences in VMI scores, and are shown in Table II.

Insert Table II about here

As a main effect, sex yielded an $F_{1,91}$ of 1.07 ($p = .31$), and in a two-way interaction with condition sex yielded an $F_{3,91}$ of less than 1.00. For a more powerful test, a one-way analysis of covariance for condition on adjusted accuracy means, with VMI covaried (BMD; Dixon, 1973), showed a statistically significant omnibus $F_{3,95}$ statistic of 2.75 ($p < .05$). The summary analysis is shown in Table III.

A test for homogeniety of regression was not statistically significant at $p > .50$ ($F = 0.64$, $df = 3,92$). This signals the absence of aptitude-treatment interactions.

A post hoc t-test on adjusted means, using orthogonal contrasts, showed that the Core + Neg condition produced significantly lower accuracy relative to both the Core and the Neg + Core conditions ($p < .05$). A t-test matrix for adjusted group means is shown in Table IV.

The two-way analysis of covariance (sex x condition) on the latency totals, with VMI covaried yielded a significant main effect for condition ($F_{3,91} = 5.05$; $p = .003$). Over one-third of the task responses in the

Core + Neg condition were 0.0 seconds, due to the fact that many children in this condition began the response immediately after the core part of the message, or at least before the end of the complete message. A comparison of the means and ranges of latency in the four conditions is found in Table V.

Insert Tables 3, 4 and 5 about here

Discussion and Conclusions

The most important result emerging from this study was that two conditions, Core and Neg + Core, produced better decoder success than the Core + Neg condition. This relationship still existed when adjustments were made for VMI scores, which correlated significantly with task scores. Contrary to expectation, the addition of a cautionary word, "just", did not produce higher scores than the core instruction alone. This result was particularly surprising, considering the fact that in the Gehlbach study, the correlations of cautionary words and total scores were .33 and .35 (N = 60). Unlike this study, messages in the Gehlbach study were generated by 60 teacher-subjects and varied on a number of dimensions (e.g., length, content, and repetition). The introduction of the additional variables without controls may account for the discrepancy in the results of the two studies. It is further possible that in a replication of the present study with a larger sample, the addition of a cautionary word would emerge as a stronger variable. On the other hand, the difference between the results also suggests a note of caution regarding prescriptive

statements which are based on the results of correlational studies alone, and emphasizes the need for experimental tests.

In retrospect, it is not surprising that the core instruction followed by an explicit negative yielded the poorest results. In this condition seventeen subjects started to trace seventy-four of the tasks immediately after the core statement. Of these, some completed the task with no apparent attention to the explicit negative. Others started, stopped, then started again, with varying degrees of success. Still others started, and then stopped at whatever point they happened to have reached when they heard the explicit negative. Frowns, raised eyebrows, and glances toward the examiner indicated a degree of confusion not evidenced in the other conditions.

Although latency did not correlate significantly with any other variables, in the Core + Neg condition the correlation between latency and VMI was -.42 ($p < .05$). As described earlier, many subjects began the task immediately after the core message, yielding a latency measure of zero seconds. Beery and Buktenika (1967) found a high correlation between VMI and mental age. It is conceiveable that subjects who scored high on VMI had enough information from the Core part of the message to be able to start, but were then confused by the interference of the explicit negative, thus depressing the accuracy scores in spite of the correlation between VMI and accuracy. In a subsequent study, it might be advisable to record either a negative latency (i.e., the time elapsed between the onset of activity and the end of instruction) or a more precise measure of the start, stop, start sequence. Without these

measurements, there is no clear picture of what actually occurred in the Core + Neg condition.

Clark (1974) theorized that an explicit negative is more difficult to process than a positive (Core) instruction, which might explain the low accuracy scores in the Core + Neg condition. However, it does not explain the significant improvement in decoder accuracy when the explicit negative precedes, rather than follows the core statement. It is possible that the difficulty in processing the negative results in no action, until the positive statement clarifies the instruction.

Another possible explanation is that the explicit negative preceding the core instruction serves as a "verbal marker of importance" (Pinney, 1969). If this is the case, the words "not ... all" in the explicit negative, in fact, call attention to the words "part of" in the core message, making the limiting feature of the core message more salient. In the case of the Core + Neg condition, where the core message has already been processed, and perhaps even acted upon, it is possibly too late for the explicit negative to serve as a warning, or director of attention.

From yet another point of view, Gibson's (1969) theory of attention to salient features would suggest that subjects attended first to a single verb and noun (e.g., "trace ... circle"). When this was effectively countermanded by the other salient features (e.g., "not trace ..." or "... Not ... all") the mandates were effectively incompatible. This would explain the significantly lower accuracy scores in the Core + Neg condition as compared to the Core condition.

Although Clark, Pinney and Gibson provide us with theories for why both the Core and the Neg + Core conditions produce significantly better accuracy scores than the Core + Neg condition, we are still faced with the question of why there is no significant difference between the Core and the Neg + Core conditions. We can only conclude that while an explicit negative preceding a core message may help some children, in terms perhaps, of marking salient features, it at least does not confuse them, as would appear to be the case when the explicit negative occurs after the core message.

Visual-motor integration was the only "aptitude" considered in the investigation of aptitude-treatment interaction, since there was virtually no correlation between accuracy scores and other trait variables. Results indicate that there was no interaction. It is possible, of course, that a replication of the study or an increase in sample size would yield inconsistent results. Furthermore, as Cronbach suggests (1975) a higher order interaction, using VMI plus one or more other variables, could account for more of the variance than presently indicated. Thus, conclusions drawn from the aptitude-treatment interaction data in this study must be considered with sample size and number of variables in mind. Nevertheless, results of the study suggest further investigation of micro-variables in teachers' instruction to young children as a promising source of substantive information for teacher training in verbal explaining and directing.

There is little doubt that the average adult or older child could successfully perform any one of the tasks presented in this study in any

one of the four conditions. However, the significant main effects for the four conditions of differently encoded instructions, as evidenced by the analyses of covariance in this study, suggest that for young children there is good reason for attention to such small differences in messages. Difficulties in successful completion of tasks might well be a result of micro-variables in the teachers' instruction. Further investigation of such micro-variables could well yield a "set of rules" easily applied by the teacher, and result in instructions which cut across individual pupil differences to produce more successful completion of tasks.

BIBLIOGRAPHY

Andersch, E.G., Staats, L.C., and Bostrom, R.N. Communication in everyday use. New York: Holt, Rinehart & Winston, 1969.

Ausubel, D.P. The use of advanced organizers in the learning and retention of meaningful material. Journal of Educational Psychology, 1960, 51, 267-272.

Barnes, B.R., and Clawson, E.U. Do advance organizers facilitate learning? Recommendations for further research based on an analysis of 32 studies. Review of Educational Research, Fall, 1975, 45, No. 4, 637-660.

Beery, K. Visual-motor integration. Monograph, Chicago: Follett Publishing Co., 1967.

Beery, K., and Buktenika, N.A. Developmental Test of Visual Motor Integration. Chicago: Follett Publishing Co., 1967.

Bloom, L.M., Language development: Form and function in emerging grammars. Cambridge, Mass: MIT Press, 1970.

Bloom, L.M., Language development review. In Horowitz, F.D. (Ed.), Review of Child Development Research, 4, Chicago: University of Chicago Press, 1975.

Braine, M., The acquisition of language in infant and child. In Reed, C. (Ed.), The learning of language, New York: Appleton-Century Crofts, 1971.

Chomsky, C., The acquisition of syntax in children from 5 to 10. Research Monograph No. 57. Cambridge, Mass: MIT Press, 1969.

Clark, H.H., The power of positive speaking. Psychology Today, Sept., 1974, 102, 108-9, 111.

Dunkin, M.J. and Biddle, B.J., The study of teaching, New York: Holt, Rinehart & Winston, Inc., 1974.

Gage, N.L., Paradigms for research on teaching. In N.L. Gage (Ed.), Handbook of research on teaching, Chicago: Rand McNally, 1963.

Gage, N.L. and Berliner, D.C., Educational psychology. Chicago: Rand McNally, 1975.

Gehlbach, R. Verbal correlates of instructional effectiveness with kindergarten children. Paper presented at annual meeting of AERA Washington, D.C., April, 1975.

Gibson, E.J. Principles of perceptual learning and development. New York: Appleton-Century Crofts, 1969.

Ginsburg, H. and Opper, S., Piaget's theory of intellectual development: an introduction. New Jersey: Prentice-Hall, 1969.

Glucksberg, S., Krauss, R.M. and Higgins, E.T., Referential communication skills. In Horowitz, F.D. (Ed.), Review of Child Development Research, 4, Chicago: University of Chicago Press, 1975.

Hiller, J.H., Fisher, G.A. and Kaess, W., A computer investigation of verbal characteristics of effective classroom lecturing. American Educational Research Journal, 1969, 6, 661-675.

Himmel, C.E. College learning with and without formal classroom instruction: a comparison. Psychology in the Schools, 9, July, 1972, 272-277.

Katz, J.M. Reflection-impulsivity and color-form sorting. Child Development, 1971, 42, 745-754.

Kagan, J., Impulsive and reflective children: significance of conceptual tempo. In Krumboltz, J. (Ed.), Learning and the educational process, Chicago: Rand McNally and Co., 1965.

McLeish, J. The lecture method. In Gage, N.L. (Ed.), The psychology of teaching methods, Chicago: University of Chicago Press, 1976, 252-301.

Olson, D.R., Cognitive Development: The child's acquisition of diagonality. New York: Academic Press, 1970.

Piaget, J. Science of education and the psychology of the child. New York: Orion Press, 1970.

Pikas, A. Comparisons between traditional and programmed learning as functions of passive performance and active application and time till application. Cited in Gage, N.L., (Ed.), The psychology of teaching methods, Chicago: University Press, 1976.

Pinney, ..H., Presentational behaviors related to success in teaching. Unpublished doctoral dissertation, cited in Gage, N.L. and Berliner, D.C., Educational psychology, Chicago: Rand McNally, 1975.

Rosenshine, B., Evaluation of classroom instruction. Review of Educational Research, 1970 40, 279-300.

Rosenshine, B., and Furst, N., The use of direct observation to study teaching. In Travers, R.M. (Ed.), Second Handbook of Research on Teaching, Chicago: Rand McNally, 1973, 122-183.

Zelniker, T., Jeffrey, W.E., Ault, R. and Parsons, J., Analysis and modification of search strategies of impulsive and reflective children on The Matching Familiar Figures Test. Child Development, 1972, 43, 321-335.

TABLE I

Means and Standard Deviations for Accuracy
Latency, Visual-motor Integration
and Age in Four Conditions

		Total	Conditions			
			Core	Core + Caution	Core + Neg	Neg + Core
Accuracy	M	9.49	10.68	9.40	6.80	11.08
(Maximum=18)	S.D.	5.69	6.24	5.95	5.20	4.54
Latency	M	200.82	217.56	193.16	140.60	251.96
(in seconds)	S.D.	109.85	105.52	64.42	101.71	131.50
VMI	M	10.27	10.52	10.56	9.80	10.20
(Maximum=15)	S.D.	1.96	2.04	1.47	2.27	1.97
Age	M	70.45	69.60	71.72	69.76	70.72
(in months)	S.D.	3.92	4.80	3.27	3.53	3.75

Accuracy and latency means are derived from totals of nine task scores for each subject.

TABLE II

Adjusted Group Means for Accuracy in Four Conditions

	N	Adjusted Mean	S.E.
Core	25	10.36	0.993
Core + Caution	25	9.03	0.994
Core + Neg	25	7.40	0.999
Neg + Core	25	11.17	0.991

TABLE III

One-way Analysis of Covariance for Condition on Adjusted Cell Means

Source of Variance	D.F.	Sum of Sq.	Mean Sq.	F-Value
Equality of Adj. Cell Means	3	202.40	67.56	2.75
Zero Slope	1	599.33	599.33	24.39
Error	95	2333.94	24.57	
Equality of Slopes	3	47.64	15.88	0.64
Error	92	2286.30	24.85	

TABLE IV

T-test Matrix for Adjusted Group Accuracy Means

	Core	Core+Caution	Core+Neg	Neg+Core
Core	0.0			
Core + Caution	.949	0.0		
Core + Neg	2.096*	1.154	0.0	
Neg + Core	-0.575	-1.522	-2.683*	0.0

* $p < .05$

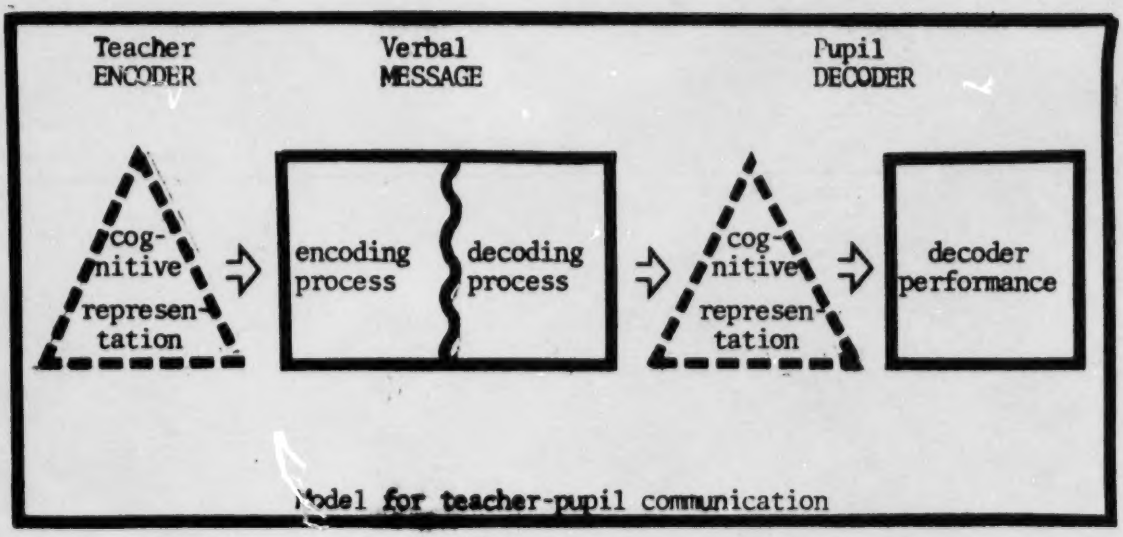
TABLE V

Mean and Range of Total Latency in Each of Four Conditions

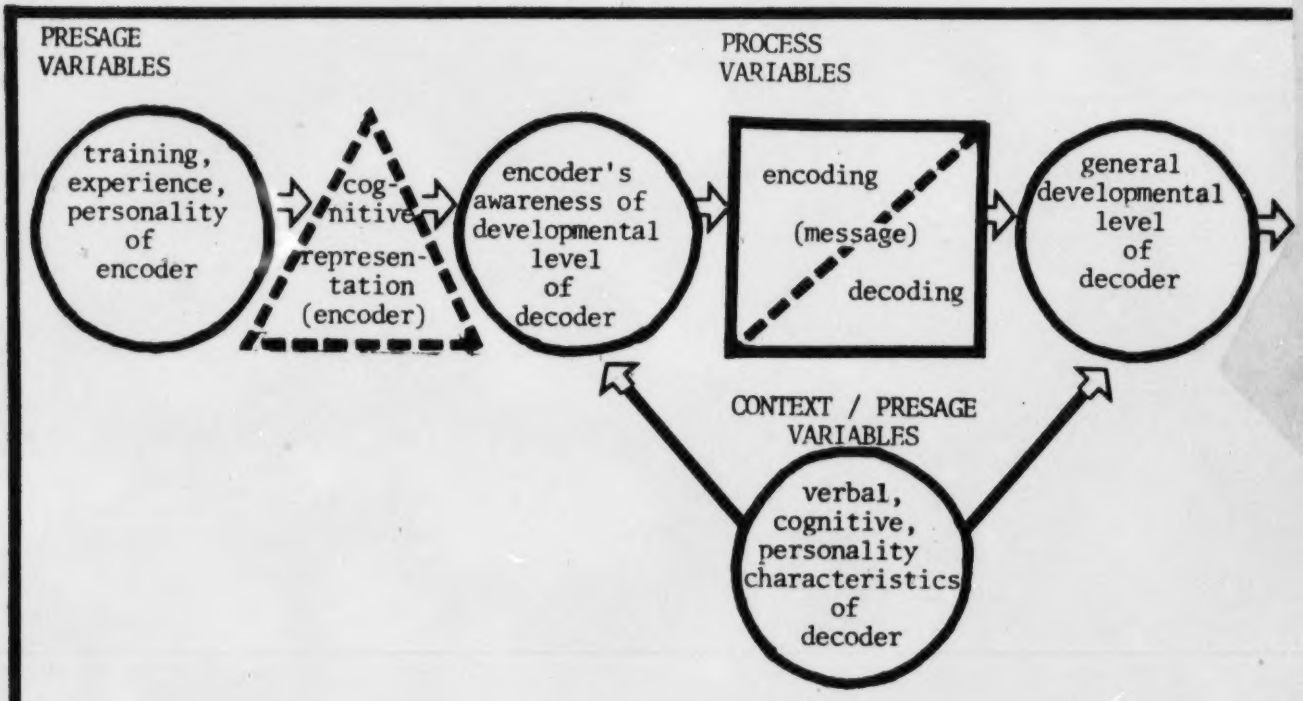
(N=100, n=25)

Condition	Mean	Minimum	Maximum
Core	217.56	51.	527.
Core + Caution	193.16	110.	400.
Core + Neg	140.60	0.	374.
Neg + Core	251.96	98.	654.

Figure 1



Model for teacher-pupil communication



Model for a study of verbal-instructional communication

Decoder's development functions as a context variable only to the degree that the encoder is aware of the development

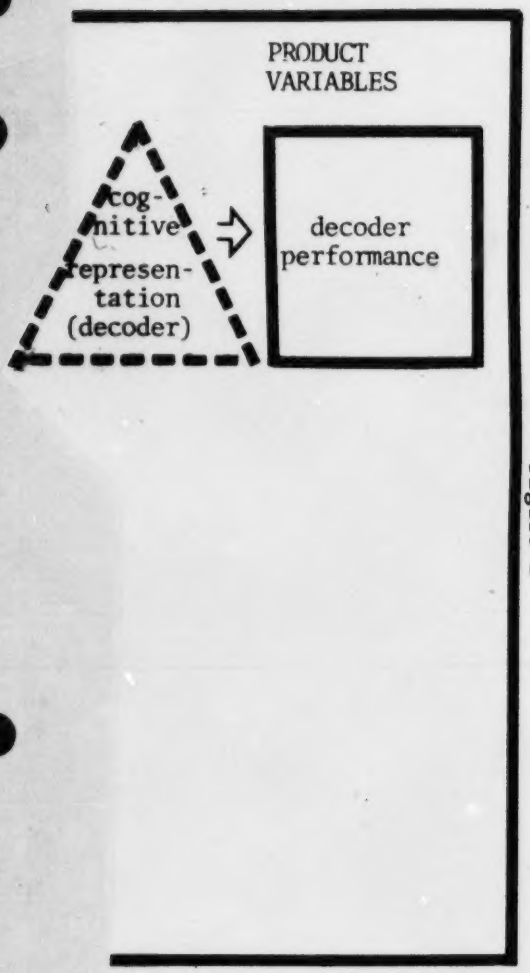

PRODUCT
VARIABLES
cog-
nitive
represen-
tation
(decoder)
decoder
performance

Figure 2

Figure 3
Task 2

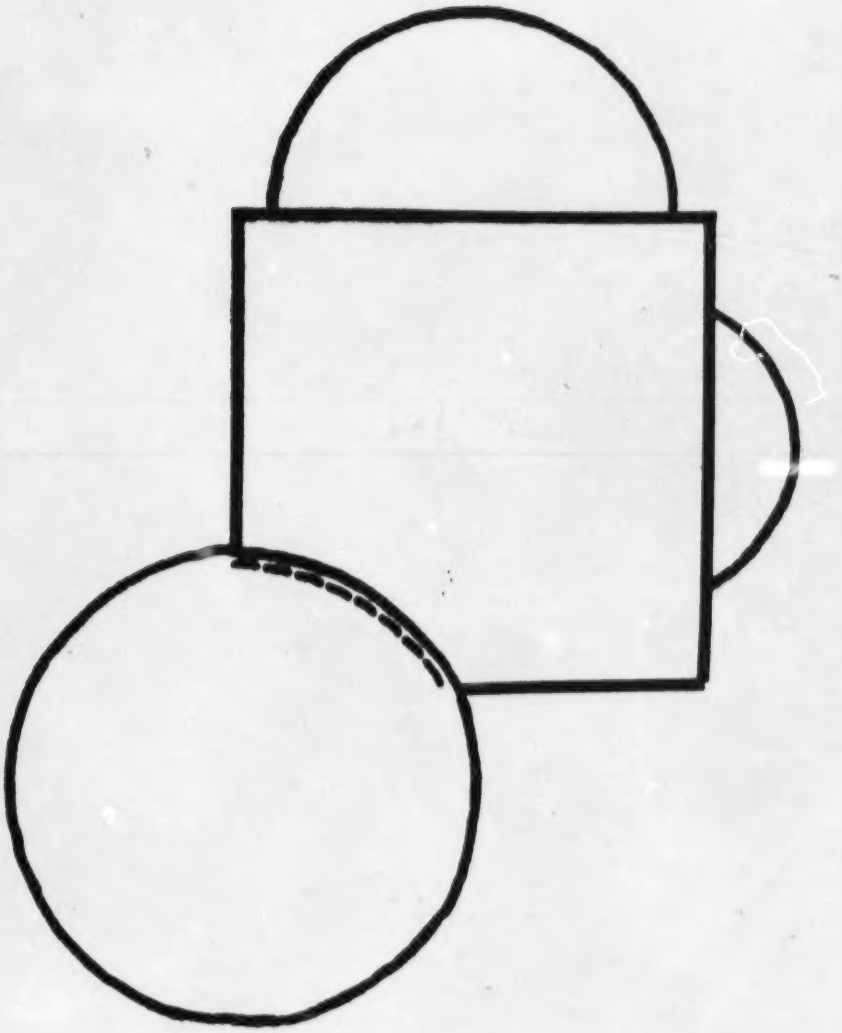


Figure 4

Task 7